

ABSTRAK

MITIGASI GEMPABUMI MENGGUNAKAN DATA GEMPA PADA TAHUN 1979-2021 DAN DATA PENGUKURAN GAYABERAT DI DAERAH BANYUMAS, JAWA TENGAH

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Penelitian ini bertujuan untuk menganalisis potensi bahaya gempabumi di wilayah Banyumas, Jawa Tengah, dengan memanfaatkan data gempa periode 1979–2021 dan data pengukuran gayaberat. Data gempa diperoleh dari *United States Geological Survey* (USGS), sedangkan data gayaberat merupakan hasil pengukuran Pusat Survei Geologi (PSG) tahun 1995. Analisis dilakukan dengan menghitung nilai *Peak Ground Acceleration* (PGA) menggunakan tiga metode empiris, yaitu Donovan, McGuirre, serta Xiang dan Gao. Nilai PGA kemudian diklasifikasikan ke dalam skala intensitas Modified Mercalli Intensity (MMI) untuk menentukan tingkat risiko seismik. Hasil penelitian menunjukkan bahwa nilai PGA tertinggi diperoleh dari metode Donovan sebesar $13005,5 \mu\text{m/s}^2$, diikuti McGuirre $11252,7 \mu\text{m/s}^2$, dan Xiang & Gao $5474,2 \mu\text{m/s}^2$. Nilai tertinggi terletak di sekitar Banjarnegara, Brebes, Tegal dan sekitarnya sedangkan wilayah Banyumas menunjukkan nilai PGA sedang sehingga tergolong lebih rendah dibandingkan area tinggi lainnya. Analisis data gayaberat memperlihatkan anomali rendah di wilayah sedimen aluvial dan anomali tinggi pada batuan beku serta metamorf yang lebih stabil. Korelasi antara peta PGA dan anomali Bouguer menunjukkan hubungan terbalik antara densitas batuan dan percepatan tanah. Hasil ini diharapkan menjadi dasar penting dalam perencanaan pembangunan dan mitigasi bencana gempa di wilayah Banyumas dan sekitarnya.

Kata kunci: mitigasi gempa bumi, Banyumas, gayaberat, *Peak Ground Acceleration* (PGA), anomali Bouguer.

ABSTRACT

EARTHQUAKE MITIGATION USING EARTHQUAKE DATA FROM 1979-2021 AND GRAVITY MEASUREMENT DATA IN THE BANYUMAS REGION, CENTRAL JAVA

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This study aims to analyze the potential earthquake hazard in the Banyumas region, Central Java, by utilizing earthquake data from the period 1979–2021 and gravity measurement data. Earthquake data were obtained from the United States Geological Survey (USGS), while gravity data were derived from measurements conducted by the Geological Survey Center (PSG) in 1995. The analysis was carried out by calculating Peak Ground Acceleration (PGA) values using three empirical methods, namely Donovan, McGuire, and Xiang and Gao. The PGA values were then classified into the Modified Mercalli Intensity (MMI) scale to determine seismic risk levels. The results indicate that the highest PGA value was obtained using the Donovan method at $13,005.5 \mu\text{m/s}^2$, followed by the McGuire method at $11,252.7 \mu\text{m/s}^2$, and the Xiang and Gao method at $5,474.2 \mu\text{m/s}^2$. The highest PGA values are concentrated around the Banjarnegara, Brebes, and Tegal areas and their surroundings, whereas the Banyumas region exhibits moderate PGA values, indicating a lower seismic hazard compared to other high-risk areas. Gravity data analysis reveals low anomalies in alluvial sediment regions and high anomalies associated with more stable igneous and metamorphic rocks. The correlation between the PGA map and Bouguer anomaly map shows an inverse relationship between rock density and ground acceleration. These results are expected to provide an important basis for development planning and earthquake disaster mitigation in the Banyumas region and its surrounding areas.

Keywords: earthquake mitigation, Banyumas, gravity, Peak Ground Acceleration (PGA), Bouguer anomaly.